BRIEF NOTE

INCIDENCE OF *LERNAEA CYPRINACEA* AMONG GOLDFISH OF NORTH POND, KELLEYS ISLAND, OHIO[1]

Lernaea cyprinacea is a copepod which is parasitic on many species of freshwater fishes and is extremely common among the goldfish, *Carassius auratus*, of North Pond.

Crofton (1971) predicted that the distribution of metazoan parasites on its hosts should correspond to a negative binomial distribution, which would indicate that the parasites are clumped among a minimum number of hosts. The data reported here are concerned with the distribution of *Lernaea cyprinacea* among the goldfish of North Pond. Although the parasite occurs on other species of fishes, the goldfish are most heavily infested. Hence they are suitable for testing the hypothesis that the distribution of the adult parasite corresponds to a negative binomial distribution.

Goldfish were sampled six times between 18 July and 25 October 1975. They were caught with either an 8 ft (¼″ mesh) minnow seine or a 20 ft (¼″ mesh) bag seine, immediately fixed in formalin and subsequently stored in 70% ethanol. The temperature of the pond was determined 2 cm below the surface.

The length, weight, and number of attached parasites of each fish were determined. The parasites were divided into 3 groups: young; mature with egg sacs; and mature without egg sacs. From these data, the proportion of young parasites in the population was calculated. Young parasites were defined as protruding no more than 3 mm from the body of the fish and lacking egg sacs.

Poisson and negative binomial distributions were calculated for each observed distribution and compared with Chi-Square goodness-of-fit tests. The predicted negative binomial distributions were determined by the maximum likelihood method outlined by Bliss (1952). The actual distribution for each sampling date was compared to calculated random and negative binomial distributions with Chi-Square goodness-of-fit tests. The mean number of parasites per fish and the percentage of young parasites of each sampling date were determined. The negative binomial distribution provided a better goodness-of-fit to the actual distribution of adult *Lernaea cyprinacea* on *Carassius auratus* than the random distribution.

The parasites tended to clump among a minimum number of hosts (table 1). The causes for this clumping are unknown but in other studies, the clumped distribution of the adult parasites was due to either the non-random distribution of the intermediate hosts (Anderson, 1974) or to non-random waves of infection (Pennycuick, 1971). In the case of *Lernaea*, the probable cause of the clumped distribution of the adults was a non-random distribution of the free-living infective first copepods.

The mean number of parasites per fish increased between 18 July and 12 August. During that time, there was a decrease in the proprotion of young adult parasites in the parasite population, corresponding to a maturation of the parasite population. With the onset of colder temperature, the incidence of the adult parasites declined until they had disappeared. The predicted Poisson distribution was significantly different from the actual distribution on three sampling dates: 18 July, 21 July, and 12 August. In contrast, the predicted negative binomial distribution was significantly different from the actual distribution only on 18 July (table 1). Due to the scarcity of the adult parasites in October, comparisons between actual and theoretical distributions in October were not possible.

STANLEY EISEN. *Zoology Department, Indiana University, Bloomington, Indiana 37401.*

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TABLE 1

Distribution of Lernaea cyprinacea *on* Carassius auratus *of North Pond, Kelleys Island, Ohio. 18 July to 25 October 1975.*

Date	Water Temp. C°	N*	Mean Parasites Per Fish	% Young Parasites	Comparison of Actual Distribution to:			
					Poisson		Neg. Binomial	
					df	P	df	P
18 July	—	358	0.816	—	2	<.005	2	<.005
31 July	34	357	0.818	90	2	<.01	2	<.5
6 Aug	22	91	1.077	68	2	<.5	1	<.5
12 Aug	28	234	1.449	58	3	<.005	4	<.9
4 Oct	11	91	0.022	100	—	—	—	—
25 Oct	15	24	0.000	—	—	—	—	—

*Number of fishes in sample.

LITERATURE CITED

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